

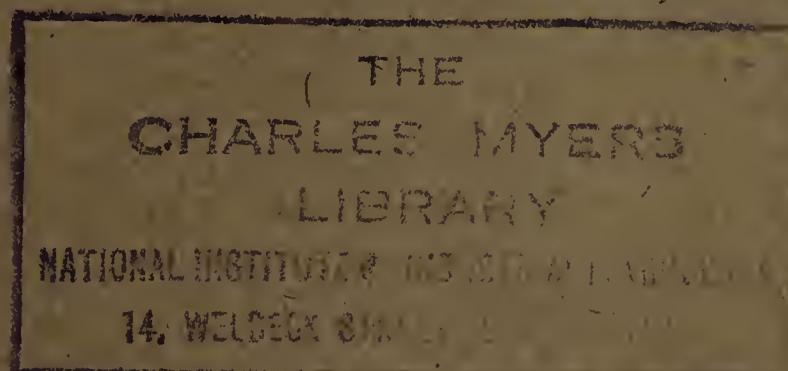
PSYCHOLOGY AND INDUSTRY

BY

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FROM THE BRITISH JOURNAL OF PSYCHOLOGY
VOL. X. PARTS 2 & 3

MARCH 1920



CAMBRIDGE
AT THE UNIVERSITY PRESS

[FROM THE JOURNAL OF PSYCHOLOGY, VOL. X. PARTS 2 & 3, MARCH, 1920.]

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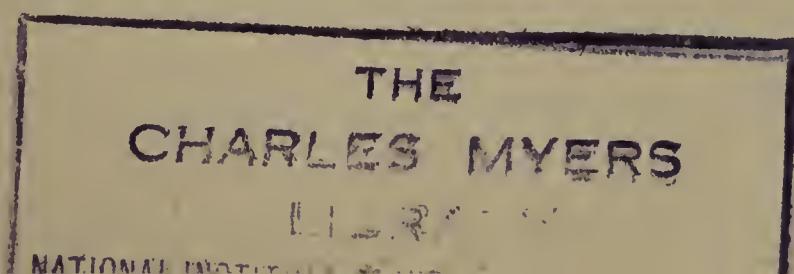
PSYCHOLOGY AND INDUSTRY¹.

By CHARLES S. MYERS.

PSYCHOLOGY must be ranked to-day among the Natural Sciences, standing in the same relation to the living Mind as Biology stands to living Matter. Biology, as is well known, has been served by two different methods of approach. There is the older 'observational' method, which has been employed in such general problems as natural selection, variation, adaptation, etc., and in compiling the Natural History of living organisms—their development, their generic, specific, individual and sexual differences, etc. And there is the 'experimental' method, which, in conjunction with the former method, has given rise to physiology, pathology, genetics, etc.; these have rapidly advanced to the position of Applied Sciences in relation to medicine, human and veterinary, to eugenics, animal and vegetable, etc.

In its earliest days Biology was a field of study for philosophers, who employed both the observational and the experimental methods of approach. Psychology, on the other hand, is only just emancipating itself from the tutelage of Philosophy. In Psychology we can likewise distinguish the observational method, which has helped to reveal to us the Natural History of mind, from the later experimental methods which have been characterized by a more thorough knowledge and a more perfect control of attendant conditions, and by a more complete freedom from metaphysical preconceptions and aims. The effects produced by varying conditions upon mental experience (or introspection) and upon bodily expression (or behaviour) have come to be studied in the laboratory, where those conditions can be simplified or complicated at will. Advantage has also been taken of Nature's own variation of such conditions, as in the clinical and laboratory study of *individual* mental differences, normal and abnormal, of excess or defect, including those produced by disorder, disease or injury, *racial* mental differences, *e.g.* the mental differences between the higher and lower races, and *generic* mental differences, *e.g.* the mental differences between the sensations,

¹ The substance of an Inaugural Address to the first Meeting of the Industrial Section of the British Psychological Society, 25 April, 1919.



intelligence, instincts, etc. of man and animals, of vertebrates and insects, and so on.

Still more recently another stage in the evolution of Psychology has been reached by the systematic study of unconscious processes and of their relations to consciousness. Whereas the earlier philosophical psychology, and the experimental school which arose from it, had been mainly intellectualistic, giving undue prominence to the play of reason, this later stage has been characterized by the emphasis it lays on the importance of instinct and the emotions, and by its devotion to the study of unconscious processes.

As in the case of Biology, the results obtained from experimental psychological methods, and indeed those methods themselves, have begun to be applied to practical purposes—first to Education, next to Medicine, and most recently to Industry, thus creating three Applied Sciences, those of Educational, Medical and Industrial Psychology; and the British Psychological Society is now instituting three Special Sections of the Society which are to be respectively devoted thereto.

In Industry (including Commerce) there are four main themes to which Psychology can be profitably applied, namely to fatigue, movement study, vocational guidance and management.

Fatigue has long been a subject of research both by physiologists and by psychologists. The physiologist has generally investigated it under the simplest experimental conditions. For example, he has isolated a single muscle of a frog from the body, and has studied the phenomena of fatigue produced in it by electrical stimulation of the muscle or of its nerve, and the effects of varying the strength and frequency of stimulation, the surrounding temperature, the weight lifted by the muscle, etc. He has also investigated the effects of muscular exercise on the general metabolism (the respiratory quotient, the excreta, etc.) of the organism. The psychologist, on the other hand, has conducted exclusively 'human' experiments, treating the organism as a whole in place of using 'muscle nerve' preparations. He has approached the problem from the standpoint of mental as well as muscular fatigue. He has devised tests of mental fatigue, constructing work curves of mental output, and analysing the psychological factors involved therein, such as spurt and practice, in turn analysing the latter into its psychological components. He has studied the effects of drugs, e.g. of tea, coffee, strychnine, and alcohol, on mental and muscular fatigue. He has examined the effects of rest pauses of different length, introduced after varying periods of work, on mental efficiency. He has shown the unreliability of certain interpo-

lated tests as evidence of muscular or mental fatigue; he has shown the importance of a rigorous, precise training in the methods of experimental psychology, in order to avoid the pitfalls incidental to human experiment; and he has so prepared the way for a systematic investigation of the more important problems of industrial fatigue that future success must depend on intimate psychological and physiological coöperation.

Movement study has as yet been scarcely touched by the psychologist. It has hitherto been mainly the purview of the industrial 'efficiency expert.' But there is obviously a vast field of promising psychological research here. The present methods are largely empirical and guess-work. The expert pays a visit to a factory where he sees a worker making a series of seemingly needless movements. He believes that time would be saved by training the worker to another, an apparently 'shorthand,' method. He tries it and, we will suppose, he finds that time is saved by its adoption. He assumes that, because a speedier method has been devised, there is no increase, or there is a decrease, of fatigue. He assumes that because this method is found to suit one worker, it is therefore the one and best method, always to be adopted by all workers. Clearly there are numerous problems for psychological experiment here, by which the applied science of Industrial Psychology will be advanced to surer ground. Similar scientific work is needed to yield reliable information in regard to other matters which are intimately connected with movement study, *e.g.* the optimal load and posture, the optimal rate and frequency of lift, etc., in persons of different muscular power, age and sex.

The study of vocational guidance is founded on that of individual differences, for the basis of which we are indebted to pure experimental psychology. Some of the earliest psychological experiments on reaction time were devoted to a study of the individual differences observed. The advantages of selecting employees in the case of certain occupations according to their speed of reaction have been shown in a certain bicycle-ball factory, where, after the selection of the best workers as indicated by reaction tests, it was found that 35 individuals could now do the work of the previous 120, and that the accuracy of the work was increased by two-thirds.

Similar results have followed from the application of psychological tests to the selection of applicants for telephone-exchange work in America. It is obvious that their hearing, vision, speech, memory for figures, memory for the order of instructions received, and their speed and accuracy of reaction to signals are readily capable of experimental estimation.

It is easy to devise tests of manual dexterity and these are already being employed in America in the selection of employees for work in which such dexterity is important.

Psychological tests of foresight are also capable of construction, and have actually been applied with success in investigations on motor tram-drivers. A very close inverse relation was found to obtain between the degree of a driver's success in the laboratory test and the number of accidents recorded against him during his every-day work.

Tests of sensory acuity and discrimination, tests of artistic endowment, tests which measure fatigability, accuracy, neatness, distractibility, improvability, memory for names and faces, powers of observation, etc. are also available. Their application to those who offer themselves for designing work, clerical work, salesmanship, etc., is obvious.

Tests of the accuracy and speed of reasoning have also been devised. Tests of general information have been frequently employed. These and other tests are about to be used at Columbia University, New York, in place of the Matriculation Examinations, so as to select those who can best profit by a University career.

During the last year of the war, I happened to be concerned in the selection, at the Crystal Palace, of candidates for training in hydrophone-listening for hostile submarines. Tests were devised for keenness of hearing, accuracy of sound discrimination, memory for pitch, rhythm and quality of sound, power to discriminate between different pitches, rhythms and qualities, general accuracy, general information, ability to grasp complicated instructions, etc. The result of the application of such tests was that the training authorities at Portland reported that the first batch of lads sent them from the Crystal Palace was far away the best they had ever received, and that the next batch was even better still!

It is perfectly clear that by the aid of properly devised tests applied by properly trained persons those leaving school could be materially helped and usefully advised in their choice of a suitable vocation, and that by their application to candidates for any industrial or commercial post the fittest could be speedily selected.

An objection may be raised that these tests throw no light on the higher moral qualities of the candidate, such as perseverance, resourcefulness, good temper, loyalty, honesty, courage, self-control and 'presence.' But in point of fact, the presence of the first two of these qualities are revealed in many existing tests or in others that can be specially devised for the purpose, whilst much light is (or can readily be) thrown on the rest in the course of individual examination and cross-questioning.

None but those who have had experience in psychological tests can realise what a wealth of information in regard to the 'character' of a subject is incidentally gained from tests systematically and *individually* applied: although the 'lower' mental characters can be easily tested in groups of fifty or a hundred or more persons simultaneously.

Under the application of Psychology to management, I include the consideration of the psychological causes of industrial discontent and restricted output, the psychological advantages of different methods of payment and supervision, and other conditions which affect the efficiency and the happiness of the workers. During the last few years a flood of light has been thrown on the importance of the emotions and on the changes which they effect and to which they are subject. We now recognise how prone we are to rationalise, *i.e.* to give an intellectual reason for actions which are really prompted by emotional states, or by subtler influences which are unknown to us or which for good reasons dare not be faced. We now recognise that in order to avoid causing excessive self-depreciation an emotion may undergo a process of 'projection.' Thus instead of reproaching ourselves we may attribute the reproach to others; hence arise delusions of suspicion and even persecution. Or, for the same purpose, an emotion may be 'inverted,' *e.g.* shyness becoming concealed by an affected boisterousness, the desire for a person of the opposite sex by aversion, submissiveness by defiance. We understand now more fully the psychological basis of worry and anxiety, the importance of their early treatment, and the psychotherapy of the functional nervous disorders to which, if unresolved, they may give rise. The application of such new advances to the problems of industrial unrest is sufficiently obvious.

It may be asked whether a Special Section of the British Psychological Society is the most appropriate body for the promotion and communication of researches bearing on Industrial Psychology, or whether a separate society should not have been constituted in its stead for these objects. To this question, I think, there is a very clear answer. The British Psychological Society is henceforth to consist of three Special Sections devoted to Education, Industry and Medicine, and of a General Section devoted to the other aspects of Psychology, from which it is hoped in the near future to form further Sections for Social Psychology, the Psychology of Aesthetics, Animal Psychology, etc. The Society consists, therefore, of members interested in every branch of knowledge to which Psychology is applicable. It will afford opportunity for the holding of joint meetings between Sections, at which subjects of common interest can be profitably discussed. Thus, the Industrial and Medical Sections could

advantageously combine in considering the psychology and psychotherapy of industrial neurasthenia: the Industrial and Educational Sections could profitably hold a joint meeting to discuss from the psychological standpoint the best arrangements for industrial education. Each Section of Applied Psychology must thus reap advantages by intercourse with the other Sections, while the presence and coöperation of those engaged in pure psychological research cannot fail to lift Applied Science to a higher plane.

The *British Journal of Psychology* is issued in parts at irregular intervals ; four parts will (usually) constitute a volume of about 350 pages, Royal 8vo.

Papers for publication should be sent to Dr C. S. MYERS, 30 Montagu Square, London, W. 1.

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